REMARKS

By this amendment, claims 1, 24 and 25 have been amended and new claims 30-35 have been added. Support for new claims 30-35 is found, *inter alia,* in Examples 1-2, 1-3, 1-4, 1-5, 2-1, and 2-11. Favorable consideration and allowance are respectfully requested for claims 1, 2, 4, and 23-35 in view of the foregoing amendments and following remarks.

The rejection of claims 1, 2 and 4 under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a) over U.S. Patent No. 5,608,123 ("Inoue"), and the rejection of claims 23-26 under 35 U.S.C. § 103(a) over Inoue in view Niida et al., *J. Non-Crystalline Solids,* 306:292-99 (2002) ("Niida") are respectfully traversed.

Independent claim 1 recites a process for producing an organic-inorganic hybrid glassy material. The process comprises the sequential steps of producing a gel body by a sol-gel method in which at least one kind of a silicon alkoxide containing a phenyl group is used as a sol-gel raw material; melting the gel body by heating into a melt; and aging the melt at a temperature of from 30°C to 400°C for a period of time of 5 minutes or longer.

Independent claim 23 recites a process for producing an organic-inorganic hybrid glassy material comprising the sequential steps of producing a gel body by a sol-gel method in which at least one kind of a silicon alkoxide containing a phenyl group is used as a sol-gel raw material; mixing the gel body with a substance obtained by a non-aqueous acid-base reaction method to prepare a mixture; melting the mixture by heating into a melt; and aging the melt at a temperature of from 30°C to 400°C for a period of time of 5 minutes or longer.

The Office Action asserts on page 3 that:

> Inoue discloses a process for producing a hybrid glassy material comprising producing a gel body by a sol-gel method using phenyltriethoxysilane as the sol-gel raw material and heating the gel body to a temperature of 120°C for 6 hours . . . , wherein this heating effectively melts the gel body and ages the melt, since the temperature and duration of the heating step similarly performed by the applicant as recited in the disclosure of the application.

Applicants respectfully disagree. Rather than disclosing "heating [that] effectively melts the gel body and ages the melt", Inoue actually discloses:

> "After solvents and water were removed from the gelled mixture obtained under reduced pressure to dry, the dried gel was thoroughly washed with water and then ***dried*** again for 6 hours at 120° C to obtain polyorganosiloxane." (Column 12, lines 8-11, emphasis added).

The drying of Inoue is completely different from the presently claimed melting of the gel body by heating into a melt. Thus, Inoue does not disclose ***melting the gel body by heating into a melt***, as recited in claim 1. In particular, the melting recited in claim 1 is demonstrated by the measurement data of softening temperature (TMA measurement results) of FIGs. 1 and 4 of the present application.

Regarding siloxane 5 of Inoue, Applicants respectfully submit that the meltability of the gel body disappears by repeated heating due to containment of only phenyltriethoxysilane as the sol-gel raw material. Regarding the remaining siloxanes of Table 2 in column 12 of Inoue, each of siloxane 6, siloxane 7, and siloxane 8 of Inoue contains a relatively high content of tetraethoxysilane, as compared with phenyltriethoxysilane. Accordingly, there is a strong tendency for ***the gel body to dry*** by heating due to the conversion of tetraethoxysilane into silica (SiO_2). As previously explained in the Amendment filed November 2, 2007, when water is present, tetraethoxysilane ($Si(OC_2H_5)_4$) is converted into silica (SiO_2) through ***hydrolysis and polycondensation***. In fact, silanol groups Si-OH are formed by the hydrolysis, as shown in the following reaction:

$$Si(OR)_4 + 4H_2O \rightarrow Si(OH)_4 \text{ and } 4\ ROH,$$

where R is an ethyl group in the case of tetraethoxysilane. Silanol groups Si-OH are highly reactive. When these reactive silanol groups get near one another, polycondensation occurs instantaneously to form a network of -Si-O-Si-O-Si- (note that in fact each silicon atom has four bonding arms and therefore is bound to four oxygen atoms) with the release of water (H_2O). The formation of this network also results the formation of silica (SiO_2). Once silica (SiO_2) is formed,

the gel body does ***not melt*** under low temperature (*e.g.*, 70°C). Under low temperature, the gel body of SiO_2 is simply ***dried*** as a result of evaporation of the remaining solvent.

In contrast, according to present claims 1 and 23, a silicon alkoxide containing phenyl group (*e.g.*, phenyltriethoxysilane ($PhSi(OEt)_3$) where Ph is a phenyl group and Et is ethyl group, is used as a sol-gel raw material. This silicon alkoxide containing phenyl group is hydrolyzed to produce silanol groups (Si-OH), ***but the silanol groups cannot get near one another due to steric hindrance by the phenyl group***. As a result of the presence of these silanol groups in the gel body, SiO_2 is ***not*** perfectly formed. Thus, the molecules of the gel body can move relatively freely within the gel body. As a result, when the gel body is heated, the gel body melts. This melting of the gel body, rather than the gel body simply drying, is a surprising and unexpected result. Further, the resulting organic-inorganic hybrid glassy material has a variety of special beneficial properties, as detailed on page 7, lines 12-30 of the present specification.

Consequently, in the case of siloxane 6, siloxane 7, and siloxane 8 of Inoue, there is less influence of phenyltriethoxysilane, which causes steric hindrance by the phenyl group, as compared to tetraethoxysilane. Thus, there is almost no meltability of the gel body of siloxane 6, siloxane 7, and siloxane 8 of Inoue even from the beginning.

Niida, which was cited for disclosure of "a precursor substance for low melting glass, obtained by a non- aqueous acid-base reaction method comprising Me_2SiO, P_2O_5, and SnO" (page 4), fails to cure the above-noted deficiencies with regard to Inoue. In particular, the proposed combination of Inoue and Niida fails to disclose or suggest ***melting the gel body by heating into a melt***, as recited in claim 23.

Furthermore, the present inventors have unexpectedly found that the organic-inorganic hybrid glassy material of claim 23 exhibits improved humidity resistance while maintaining meltability, which is neither disclosed nor

suggested by either Inoue or Niida. Accordingly, Applicants respectfully submit that claims 1, 2, 4, and 23-29 are in condition for allowance.

Regarding new claims 30-35, independent claim 30 recites a process for producing an organic-inorganic hybrid glassy material comprising the sequential steps of producing a gel body by a sol-gel method in which a phenyltrialkoxysilane and a second silane are used as sol-gel raw materials, wherein the second silane is selected from the group consisting of alkylalkoxysilanes and diphenyldialkoxysilanes; melting the gel body by heating into a melt; and aging the melt at a temperature of from 30°C to 400°C for a period of time of 5 minutes or longer. Claims 31-35 depend directly or indirectly from independent claim 30 and are patentable therewith.

Inoue does not disclose or suggest using a phenyltrialkoxysilane and a second silane (*i.e.*, an alkylalkoxysilane or a diphenyldialkoxysilane) as sol-gel raw materials. Using a phenyltrialkoxysilane and a second silane (*i.e.*, an alkylalkoxysilane or a diphenyldialkoxysilane) as sol-gel raw materials is substantially different from siloxanes 5-8 in Table 2 of Inoue. Specifically, the claimed second silane is substantially different from tetraethoxysilane of siloxanes 6-8 in Table 2 of Inoue in terms of forming a network of -Si-O-Si-O-Si- (note that in fact each silicon atom has four bonding arms and therefore is bound to four oxygen atoms, as explained above). As claim 30 recites using a phenyltrialkoxysilane and a second silane (*i.e.*, an alkylalkoxysilane or a diphenyldialkoxysilane) as sol-gel raw materials, an organic-inorganic hybrid glassy material having meltability or thermosoftening property and other good characteristics was unexpectedly obtained (see Examples 1-2 to 1-5, 2-1 and 2-11 of the present specification).

The present inventors have unexpectedly found that the organic-inorganic hybrid glassy material produced by the process of claim 32 or claim 34 is considerably superior in ***persistence of meltability or thermosoftening property***, which is a great merit of a material for various uses (see page 7, lines 16-30, of the present specification).

Accordingly, Applicants respectfully submit that new claims 30-35, particularly claims 32 and 33, which are supported by Examples 1-4 and 1-5 of the present specification, and claims 34 and 35, which are supported by Example 1-3 of the present specification, are patentable over Inoue and are in condition for allowance.

In view of the foregoing amendments and remarks, the application is respectfully submitted to be in condition for allowance, and prompt, favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned at (202) 624-2845 would be appreciated since this should expedite the examination of the application.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket No. 038788.53357US).

Respectfully submitted,

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